

**Amendments to the Drawings:**

The attached sheets of drawings include FIGS. 2, 4A and 4B which replace the original sheets including FIGS. 2 and 4 and in accordance with previously submitted drawing revisions (for the Examiner's convenience, previously submitted FIGS. 2, 4A and 4B, with changes shown in red, are also included). No new matter has been added.

**REMARKS**

The Final Office Action mailed March 2, 2004, has been received and reviewed. Claims 1, 3, 4, and 18 through 26 are currently pending in the application. Claims 1, 3, 4, and 18 through 26 stand rejected. Applicants propose to amend claims 1, 3, 4, 20, 22, 23 and 25, and respectfully request reconsideration of the application as proposed to be amended herein.

**Information Disclosure Statement**

Applicants note the filing of an Information Disclosure Statement herein on December 12, 2003 and note that no copy of the PTO-1449 was returned with the outstanding Office Action. Applicants respectfully request that the information cited on the PTO-1449 be made of record herein.

**Objections to the Drawings**

The Examiner objects to the drawings as failing to comply with 37 CFR 1.84(p)(5) because FIG. 2 does not include the reference sign "200." Applicants note that FIG. 2 *does* include the reference sign "200" and, that, in a previously submitted Amendment Applicants amended the lead line associated therewith for purposes of clarity.

Applicants submit, herewith, replacement FIGS. 2, 4A and 4B which incorporate drawing changes already submitted (see Amendments mailed on May 3, 2003, and November 17, 2003 – copies of previously submitted FIGS. 2 and 4A and 4B showing changes marked in red are also included herewith for the convenience of the Examiner).

**35 U.S.C. § 102(b) Anticipation Rejections**

**Anticipation Rejection Based on U.S. Patent No. 5,114,880 to Lin**

Claims 1, 3, 4, 18 through 20, 22 and 26 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Lin (U.S. Patent No. 5,114,880). Applicants respectfully traverse this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v.*

*Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The Examiner cites Lin as disclosing a method of forming an integrated circuit package which includes:

forming a lead frame 22 having a plurality of conductors 18 and at least one alignment feature “distal portions of leads”; coupling 21 at least some of the plurality of conductors to a semiconductor die 20; encapsulating the semiconductor die on a portion of the lead frame with an insulating material 16; electrically isolating “severed” the at least one alignment feature from the plurality of conductors subsequent the encapsulating the semiconductor die and a portion of the leadframe; and removing the at least one alignment feature “removing the carrier structure” subsequent the electrically isolating the at least one alignment feature from the plurality of conductors (col. 5, lines 28-30); forming the at least one alignment feature to include at least one aperture (opening/open space across the “pitch” of the distal portions of leads) forming the at least one alignment feature to include a plurality of apertures; forming the at least one alignment feature to include a plurality of apertures: forming a separation line (inherent in the process of severing) in the lead frame and wherein removing the at least one alignment feature further comprises removing the at least one alignment feature along the separation line; and forming the at least one alignment feature to include a tab 28. (Final Action, pages 2 - 3).

Additionally, the Examiner cites Lin as teaching “encompassing the semiconductor die, a portion of each of the plurality of conductors, substantially encompassing the at least one alignment feature with an insulating material 14, 16 and electrically isolating (via ‘removing the carrier’) the at least one alignment feature from the plurality of conductors; and providing a tie bar 24 and forming the at least one alignment feature in the tie bar.” (*Id.*, pages 3 - 4). The

Examiner additionally cites Lin as disclosing the presently claimed methods of forming and testing an integrated circuit package.

With regard to the Examiner's reliance on Lin for the limitation of *forming a lead frame including...an alignment feature*, the Examiner makes the following statement:

To further clarify the disclosure of at least one alignment feature "distal portions of leads," the at least one alignment feature to include at least one opening/open space across the pitch of the distal portions of leads, and at least one alignment feature in the tie bar, it is noted that the distal portions of the leads, the opening/open space across the pitch of the distal portions of leads, and the portion of 24 encompassed by insulating material 16 are inherently in alignment with the claimed package elements; for example, they are in alignment with the insulating material 16. In any case the limitation "alignment" is a statement of intended use of the feature which does not result in a structural or manipulative difference between the claimed feature and the feature of Lin. Further, because the feature of Lin has the same structure as the claimed feature, it is inherently capable of being used for the intended use, and the statement of intended use does not patentably distinguish the claimed feature from the feature of Lin. (*Id.*, pages 4-5).

While Applicants disagree with the Examiner's assessment of Lin's teachings with respect to the presently claimed methods, Applicants propose to amend claims 1, 3, 4, 20, 23 and 25 as discussed in further detail hereinbelow.

Claims 1, 18 through 20 and 22

Independent claim 1, as proposed to be amended herein, is directed to a method of forming an integrated circuit package. The method includes: forming a lead frame having a plurality of leads *and at least one alignment feature distinct from the plurality of leads and configuring the at least one alignment feature for cooperative engagement with a structure external to the integrated circuit package*; coupling at least some of the plurality of leads to a

semiconductor die; encapsulating the semiconductor die and a portion of the lead frame with an insulating material; *electrically isolating the at least one alignment feature from the plurality of leads subsequent the encapsulating the semiconductor die and a portion of the leadframe while maintaining the at least one alignment feature as a part of the integrated circuit package*; and removing the at least one alignment feature subsequent the electrically isolating the at least one alignment feature from the plurality of leads.

Applicants respectfully submit that Lin fails to teach all of the limitations set forth in claim 1, as proposed to be amended herein. More specifically, Lin fails to teach forming a leadframe having a plurality of leads and at least one alignment feature *distinct from the plurality of leads* and configuring the at least one alignment feature for cooperative engagement with a structure external to the integrated circuit package. Moreover, Applicants submit that Lin fails to teach *electrically isolating the at least one alignment feature from the plurality of leads subsequent the encapsulating the semiconductor die and a portion of the leadframe while maintaining the at least one alignment feature as a part of the integrated circuit package*. As such, Applicants submit that claim 1 is clearly allowable over Lin.

Applicants further submit that claims 18 through 20 and 22 are also allowable as being dependent from an allowable base claim as well as for the additional subject matter introduced thereby.

With respect to claims 18 and 19, Applicants submit that Lin fails to teach at least one alignment feature which includes an aperture or a plurality of apertures and which is distinct from the plurality of leads.

With respect to claim 20, as proposed to be amended herein, Applicants submit that Lin fails to teach forming a separation line in the lead frame prior to removal of the at least one alignment feature and wherein removing the at least one alignment feature further comprises removing the at least one alignment feature along the separation line.

With respect to claim 22, as proposed to be amended herein, Applicants submit that Lin fails to teach forming the at least one alignment feature to include a tab protruding from an outer peripheral boundary of the insulating material.

Applicants, therefore, respectfully request reconsideration and allowance of claims 1, 18 through 20 and 22.

Claims 3 and 26

Independent claim 3, as proposed to be amended herein, is directed to a method of forming an integrated circuit package. The method includes: forming a leadframe having a plurality of leads and *at least one alignment feature distinct from the plurality of leads and configuring the at least one alignment feature for cooperative engagement with a structure external to the integrated circuit package*; coupling at least some of the plurality of leads to a semiconductor die; and encompassing the semiconductor die, a portion of each of the plurality of leads, *and substantially encompassing the at least one alignment feature with an insulating material*; and *electrically isolating the at least one alignment feature from the plurality of leads while maintaining the at least one alignment feature as a part of the integrated circuit package*.

Applicants respectfully submit that Lin fails to teach all of the limitations set forth in claim 3, as proposed to be amended herein. More specifically, Lin fails to teach forming a leadframe having a plurality of leads and at least one alignment feature *distinct from the plurality of leads* and configuring the at least one alignment feature for cooperative engagement with a structure external to the integrated circuit package. Nor does Lin teach substantially encompassing such an alignment feature with insulating material. Moreover, Applicants submit that Lin fails to teach *electrically isolating the at least one alignment feature from the plurality of leads...while maintaining the at least one alignment feature as a part of the integrated circuit package*.

As such, Applicants submit that claim 3 is clearly allowable over Lin. Applicants further submit that claim 26 is also allowable at least by virtue of its dependency from an allowable base claim. Applicants, therefore, respectfully request reconsideration and allowance of claims 3 and 26.

Claim 4

Independent claim 4, as proposed to be amended herein, is directed to a method of

forming and testing an integrated circuit package. The method includes: forming a leadframe having a plurality of leads *and at least one alignment feature distinct from the plurality of leads*; electrically coupling at least some of the plurality of leads to a semiconductor die; encompassing the semiconductor die, a portion of each of the plurality of leads, and *substantially encompassing the at least one alignment feature with an insulating material*; *electrically isolating the at least one alignment feature from the plurality of conductors while maintaining the at least one alignment feature as a part of the integrated circuit package*; *coupling the at least one alignment feature encompassed by the insulating material with a portion of a testing device*; and testing the integrated circuit package through at least some of the electrically coupled conductors.

Applicants respectfully submit that Lin fails to teach all of the limitations set forth in claim 4, as proposed to be amended herein. More specifically, Lin fails to teach forming a leadframe having a plurality of leads and at least one alignment feature *distinct from the plurality of leads*; substantially encompassing the at least one alignment feature with insulating material; or *electrically isolating the at least one alignment feature from the plurality of leads... while maintaining the at least one alignment feature as a part of the integrated circuit package*. Nor does Lin teach *coupling* the at least one alignment feature, as so defined in claim 4, with a portion of a testing device.

Applicants, therefore, submit that claim 4 is allowable over Lin and respectfully request reconsideration and allowance thereof.

### **35 U.S.C. § 103(a) Obviousness Rejections**

#### **Obviousness Rejection Based on U.S. Patent No. 5,114,880 to Lin**

Claim 23 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Lin (U.S. Patent No. 5,114,880). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or**

**references when combined) must teach or suggest all the claim limitations.**

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of the claims are improper because the references fail to teach or suggest all of the limitations of the presently claimed invention.

Independent claim 23, as proposed to be amended herein, is directed to a method of forming and testing an integrated circuit package. The method includes: forming a lead frame having a plurality of leads and *at least one alignment feature distinct from the plurality of leads*; coupling at least some of the plurality of leads to a semiconductor die; encapsulating the semiconductor die and a portion of the lead frame with an insulating material; *electrically isolating the at least one alignment feature from the plurality of leads* subsequent the encapsulating the semiconductor die and a portion of the lead frame with an insulating material *while maintaining the at least one alignment feature as a part of the integrated circuit package*; *coupling the at least one alignment feature with a portion of a testing device*; testing the integrated circuit package through at least some of the electrically coupled leads; decoupling the at least one alignment feature from the portion of the testing device; and *removing the at least one alignment feature subsequent the decoupling the at least one alignment feature from the portion of the testing device*.

The Examiner relies on Lin as applied to claims 1, 3, 4, 18 through 20 and 22 hereinabove. Additionally, apparently relying on the distal ends of the leads to act as alignment features, the Examiner cites Lin as teaching that "it may also be suitable for the leads to be severed and even formed prior to removing the carrier structure." (Final Action, page 7). However, Lin fails to teach or suggest all of the limitations of independent claim 23, as proposed to be amended herein. More specifically, Lin fails to teach or suggest forming a leadframe having a plurality of leads and at least one alignment feature *distinct from the plurality of leads*. Additionally, Applicants submit that Lin fails to teach or suggest *electrically isolating the at least one alignment feature from the plurality of leads ... while maintaining the at least one*



*alignment feature as a part of the integrated circuit package. Nor does Lin teach or suggest coupling the at least one alignment feature (as formed in accordance with claim 23) with a portion of a testing device.*

Moreover, since the alignment feature of claim 23 is stated to be distinctly formed relative to the plurality of leads, the teaching of Lin - that the leads may be severed or removed prior to removing the carrier structure - fails to teach or suggest removing an alignment feature in the manner recited by claim 23.

Applicants, therefore, respectfully request reconsideration and allowance of claim 23.

Obviousness Rejection Based on U.S. Patent No. 5,114,880 to Lin as applied to claim 20, and further in combination with U.S. Patent No. 4,589,010 to Tateno

Claim 21 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Lin (U.S. Patent No. 5,114,880) as applied to claim 20, and further in combination with Tateno (U.S. Patent No. 4,589,010). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 21 depends from independent claim 1 by way of intervening claim 20. The Examiner relies on Lin as disclosing all of the limitations of claim 1 and then cites Tateno as disclosing the formation of perforations. The examiner concludes stating that, “[m]oreover, it would have been obvious to perforate the separation line of Lin because it would enable easily removing the at least one alignment feature along the separation line without damaging the encapsulating housing.” (Final Action, page 8). However, as discussed hereinabove, Lin fails to teach or suggest all of the limitations of claim 1, as proposed to be amended herein.

More specifically, Lin fails to teach or suggest forming a leadframe having a plurality of leads and at least one alignment feature *distinct from the plurality of leads* and configuring the at least one alignment feature for cooperative engagement with a structure external to the integrated circuit package. Moreover, Applicants submit that Lin fails to teach or suggest *electrically isolating the at least one alignment feature from the plurality of leads...while maintaining the at least one alignment feature as a part of the integrated circuit package*. Nor doe Tateno teach or suggest such subject matter.

Applicants, therefore, submit that claim 21 is allowable over Lin and Tateno and respectfully request reconsideration and allowance thereof.

Obviousness Rejection Based on U.S. Patent No. 5,114,880 to Lin as applied to claim 3, and further in combination with U.S. Patent No. 5,986,885 to Wyland

Claim 24 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Lin (U.S. Patent No. 5,114,880) as applied to claim 3, and further in combination with Wyland (U.S. Patent No. 5,986,885). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 24 depends from independent claim 3. The Examiner relies on Lin as disclosing all of the limitations of claim 3, and then cites Wyland as disclosing “a cut-out ‘stamped out’ tie bar 22 and lead 21.” (Final Action, page 8). The Examiner concludes that “it would have been obvious to cut-out the alignment feature 24 of Lin in order to provide it.” (*Id.*)

As discussed hereinabove, Applicants submit that Lin fails to teach or suggest all of the limitations of independent claim 3. More specifically, Lin fails to teach or suggest forming a leadframe having a plurality of leads and at least one alignment feature *distinct from the plurality of leads* and configuring the at least one alignment feature for cooperative engagement with a structure external to the integrated circuit package. Nor does Lin teach or suggest substantially encompassing such an alignment feature with insulating material. Moreover, Applicants submit that Lin fails to teach or suggest *electrically isolating the at least one alignment feature from the plurality of leads while maintaining the at least one alignment feature as a part of the integrated circuit package*. Nor does Wyland appear to teach or suggest such subject matter.

Moreover, neither Lin nor Wyland appear to teach or suggest forming an alignment feature, as set forth in claim 3 of the presently claimed invention, which includes an alignment cut-out.

Applicants, therefore, submit that claim 24 is allowable over Lin and Wyland and respectfully request reconsideration and allowance thereof.

Obviousness Rejection Based on U.S. Patent No. 5,114,880 to Lin as applied to claim 3, and

further in combination with U.S. Patent No. 5,530,295 to Mehr

Claim 25 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Lin (U.S. Patent No. 5,114,880) as applied to claim 3, and further in combination with Mehr (U.S. Patent No. 5,530,295). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 25 depends from independent claim 3. The Examiner relies on Lin as disclosing all of the limitations of independent claim 3, and then cites Mehr as disclosing a heat spreader with an alignment feature formed therein. The Examiner concludes that it would be obvious to combine the heat spreader of Mehr with the package of Lin because it would facilitate heat dissipation.

As discussed hereinabove, Applicants submit that Lin fails to teach or suggest all of the limitations of independent claim 3. More specifically, Lin fails to teach or suggest forming a leadframe having a plurality of leads and at least one alignment feature *distinct from the plurality of leads* and configuring the at least one alignment feature for cooperative engagement with a structure external to the integrated circuit package. Nor does Lin teach or suggest substantially encompassing such an alignment feature with insulating material. Furthermore, Applicants submit that Lin fails to teach or suggest *electrically isolating the at least one alignment feature from the plurality of leads...while maintaining the at least one alignment feature as a part of the integrated circuit package*. Nor does Mehr appear to teach or suggest such subject matter.

Moreover, neither Lin nor Mehr appear to teach or suggest disposing a heat spreader adjacent to, and in contact with, an external surface of the insulating material, forming at least one other alignment feature in the heat spreader and *configuring the at least one other alignment feature to substantially correspond in size and shape to the at least one alignment feature such that the at least one alignment feature and the at least one other form a cooperative alignment structure*.

Applicants, therefore, submit that claim 26 is allowable over Lin and Mehr and respectfully request reconsideration and allowance thereof.

### ENTRY OF AMENDMENTS

The proposed amendments to claims 1, 3, 4, 20, 22, 23 and 25 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application. Further, the amendments do not raise new issues or require a further search. Finally, if the Examiner determines that the amendments do not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

### CONCLUSION

Claims 1, 3, 4, and 18 through 26 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



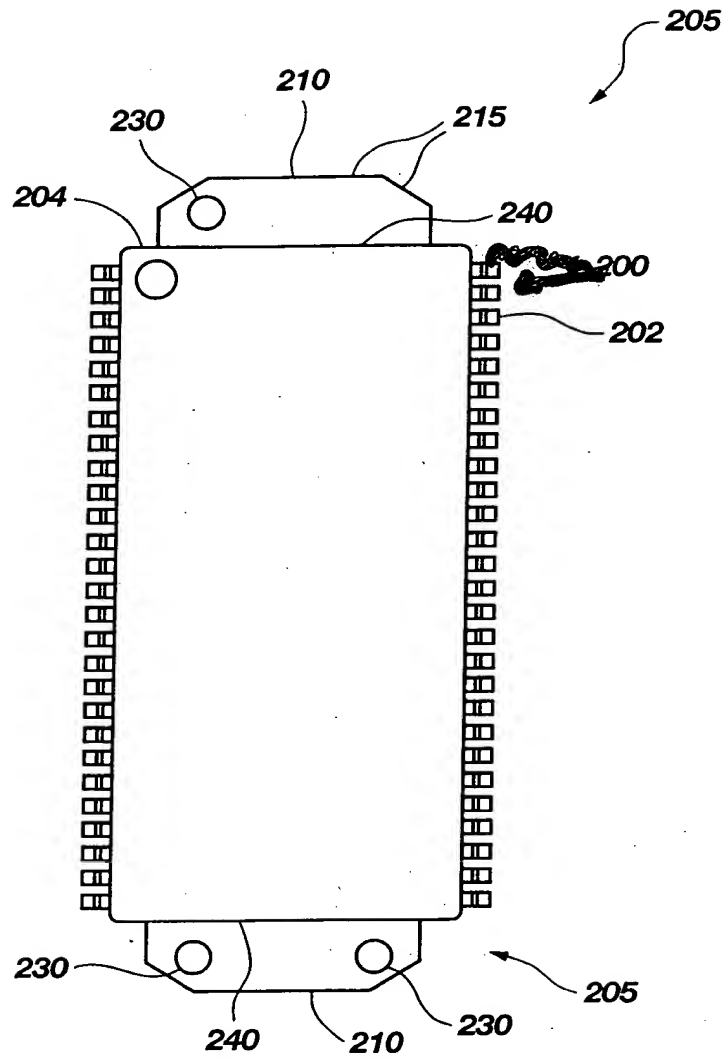
Bradley B. Jensen  
Registration No. 46,801  
Attorney for Applicants  
TRASKBRITT  
P.O. Box 2550  
Salt Lake City, Utah 84110-2550  
Telephone: 801-532-1922

Date: May 3, 2004

BBJ/dlm:djp

Attachment: Replacement Sheet  
Annotated Sheet Showing Changes

Document in ProLaw



**Fig. 2**

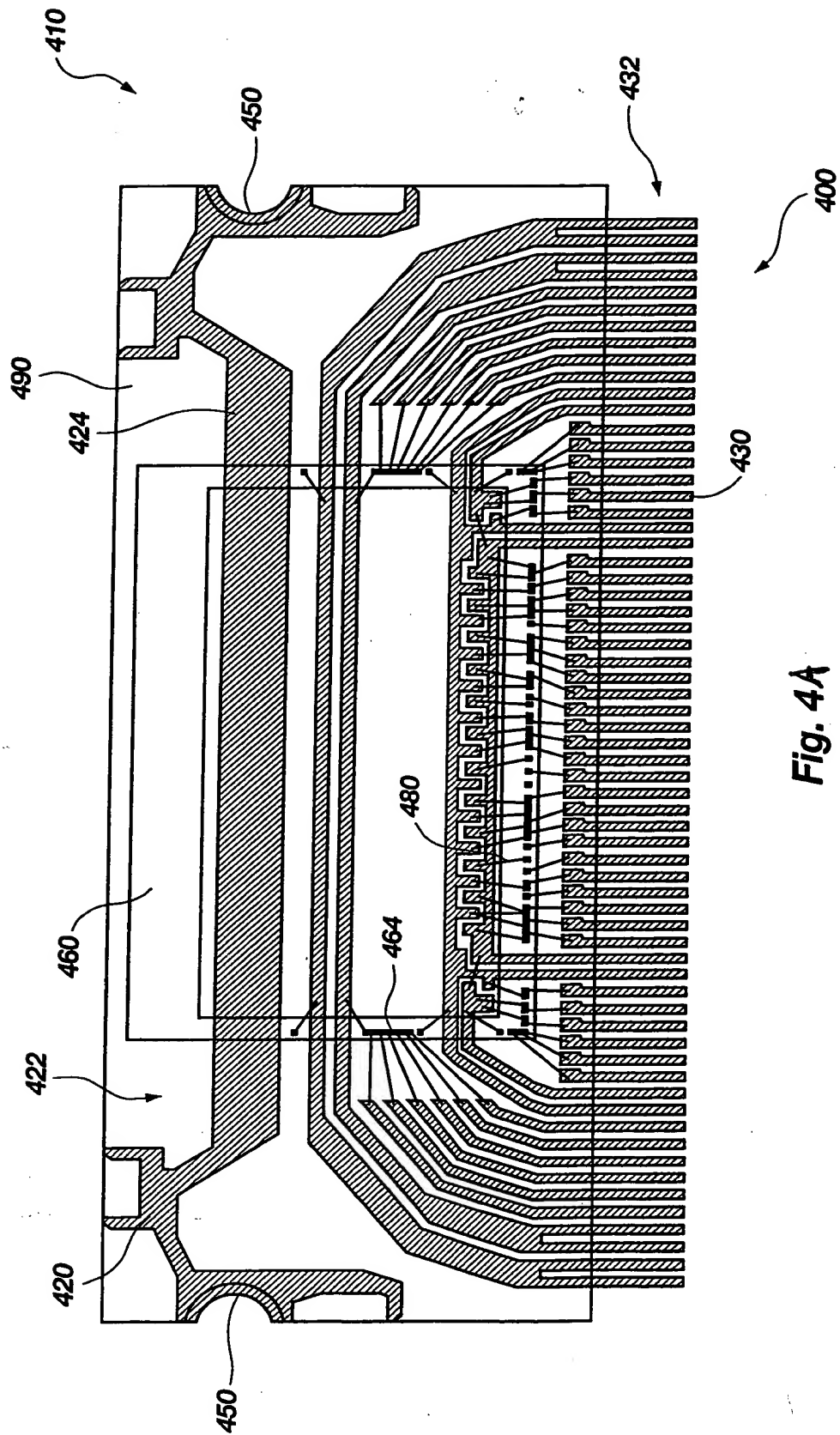


Fig. 4A

